AF/1742 IFW

Docket No.: HM-394

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	August Sprock
Serial No:	09/744,485
Filed:	March 12, 2001
For:	METHOD AND INSTALLATION FOR PRODUCING DUAL-PHASE STEEL
Examiner:	Deborah Yee
Art Unit:	1742

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBMISSION OF BRIEF ON APPEAL

S I R:

Submitted herewith is a Brief on Appeal in triplicate in support of the appeal filed April 26, 2004.

A check in the amount of $320.00 to cover the fee pursuant to 37 CFR § 1.17(c) is enclosed.

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Any additional fees or charges required at this time in connection with the application may be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,
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Dated: June 25, 2004

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 25, 2004.

By: _____ Date: June 25, 2004
Friedrich Kueffner

Patent

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BRIEF ON APPEAL

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This Brief is submitted in support of the Appeal filed April 26, 2004 from the Examiner's Final Rejection of claim 5, as set forth in the Office Action dated March 3, 2004.

REAL PARTY IN INTEREST

The present application is owned by SMS Schloemann-Siemag AG by virtue of an assignment recorded April 23, 2001, under reel 011746/frame 0352.

RELATED APPEALS AND INTERFERENCES

There are no presently pending related appeals and interferences.

STATUS OF CLAIMS

Claim 5 is the only claim in the application and is the claim on appeal.

STATUS OF AMENDMENTS

Original claims 1-4 were deleted with an Amendment filed March 5, 2002, and replaced by new claims 5-7. Claims 6 and 7 were cancelled in an Amendment after final rejection filed July 30, 2003. The Examiner issued a final rejection of claim 5 on March 23, 2004. An Amendment after final rejection in response to the Office Action dated March 23, 2004 was not filed.

SUMMARY OF THE INVENTION

The present invention is directed to a method for producing dual-phase steels.

As described in the first paragraph on page 1 of the specification, the present invention is specifically directed to a method for producing dual-phase steels from the hot-rolled state with a two-phase microstructure of 70 to 90 % ferrite and 30 to 10 % martensite by a controlled temperature guiding and defined cooling strategy during the cooling of the steels, inter alia by means of water cooling after their finish rolling, wherein in a first cooling stage at a first cooling rate the cooling curve enters the ferrite region and in a second cooling stage at a second cooling rate faster than the first slow cooling rate further cooling is carried out to temperatures below the martensite starting temperature.

In accordance with the present invention, as described in the second full paragraph on page 3 of the specification, the first cooling stage is carried out at a cooling rate of 20-30 K/s. As described in the paragraph bridging pages 6 and 7 of the specification, and as illustrated in the drawing, the cooling stretch for carrying out the first cooling stage is comprised of

several water cooling stages 7 positioned successively at a spacing from one another. The cooling curve 10 is allowed in the first cooling stage to enter the ferrite region at a temperature still so high that the ferrite formation takes place quickly. Before beginning the second cooling stage, which follows without intermediate air cooling and holding time directly after the first cooling stage, already at least 70 % of the austenite are transformed to ferrite by continuing cooling of the first cooling stage during the transformation of the austenite into ferrite up to the desired ferrite contents of at least 70%.

ISSUE PRESENTED FOR REVIEW

Whether claim 5 is unpatentable under 35 U.S.C. §103(a) over the English translation of Japanese patent 57-104650 in view of the English abstract of Japanese Patent 362112732.

ARGUMENT

It is respectfully submitted that the Examiner's rejection of claim 5 under 35 U.S.C. §103(a) as being unpatentable over the English translation of the Japanese patent '650 in view of the English abstract of Japanese patent 362112732 is in error because the references does not disclose or suggest the present invention

as claimed.

As recited in claim 5 of the present application, the invention is directed to the manufacture of dual-phase steels with a two-phase microstructure of 70-90% ferrite and 30-10% martensite which is obtained by two-stage cooling after finishing-rolling, wherein cooling takes place slowly at first and then quickly. The first or slow cooling is carried out with a cooling rate of 20-30 K/s in such a way that the cooling curve enters the ferrite region with a temperature which is still so high that the ferrite formation can take place quickly and continues without limitations with respect to temperature limit values until at least 70% of the austenite have been transformed into ferrite. The second or rapid cooling follows the first cooling without intermediate stop.

Consequently, claim 5 of the present application does not claim the manufacture of dual-phase steels; however, claim 5 provides a clear teaching for a method which ensures that a dual-phase structure of at least 70-90% ferrite and 30-10% martensite is achieved.

The Japanese reference '650 cited by the Examiner describes the manufacture of a hot-rolled sheet steel with the stated

object of obtaining a steel plate with superior formability and high strength values, wherein the reference discusses the permissible contents of the possible alloy elements C, Si, Mn, Cr, Al, S, Nb, V, Ti, Zr, Mo, Cu, Ni, P, Ca, rare earths. 19 different steel types with their contents of these alloy elements are listed in table 1.

All 19 steel types were initially slowly cooled beginning at a rolling end temperature of T_2 of 825°C. This slow cooling was carried out with a cooling rate C_1 of 20°C/sec. to T_3 600°C; subsequently, rapid cooling was carried out with a cooling rate C_2 of 60°C/sec. to a coil temperature T_4 which, depending on the steel type, was between 450 and 250°C.

A table 2 lists in altogether seven columns the strength and formabilities and in one column the structures which were obtained with the above-described cooling. In the steel types 4-8 referred to by the Examiner, the following values resulted for the obtained structure:

Steel No. 4 F + 80% M

Steel No. 5 F + 15% M

Steel No. 6 F + 10% M

Steel No. 7 F + 20% M

Steel No. 8 F + 25% M.

Consequently, the martensite content desired in accordance with the present invention was at least reached in steel types 5-8. However, depending on the given compositions of the steels, values which deviate significantly were also obtained.

Steel No. 9	F + 5% M
Steel No. 10	F + 50% M
Steel No. 15 and 16	F + P.

Table 2 does not make clear whether other structural components are contained in the cooled steel in addition to the mentioned structural components. In addition, the description of table 2 primarily only discusses the obtained steel properties and less the obtained structures. This is understandable because the Japanese reference '650 is mainly directed to obtaining certain strength properties; the obtained structure is of secondary importance in the reference.

Consequently, in accordance with table 2 and the method steps described in connection with table 2, an exclusively dual-phase structure of at least 70-90% ferrite and 30-10% martensite is not achieved in all cases as is true in accordance with the invention; rather, the structure is only obtained within wide limits as a side product when using the given cooling parameters

in dependence on the alloying elements contained in the steel. As is made clear by table 2, the method of the Japanese reference also produces values which deviate significantly from the limits according to the present invention. Even when using the parameters stated in the only method claim, i.e., claim 5,

(T_2) from 800 to 900°C

(C_1) between 5 and 80°C/sec.

(T_3) between the Ar_1-point and 550°C

(C_2) from 80°C/sec. or more

(T^4) between 350 and 500°C,

the possible variation width with respect to the structure will not change because, contrary to the clear method steps recited in claim 5 of the present application, the user has a much wider range of method steps available.

Accordingly, the clear recitation of method steps for achieving a structural transformation according to the present invention is not provided by the Japanese reference which is directed to cooling towards a temperature limit. In particular, the Japanese reference does not disclose or suggest the method step of claim 5 of the present application in which the cooling curve enters the ferrite region with a temperature which is still so high that the ferrite formation can take place quickly.

Applicant respectfully submits that even when the reference discussed above is combined with Japanese reference '732, the prior art relied on by the Examiner does not disclose or suggest the present invention as claimed in claim 5. This is because the reference does not disclose the clear teaching of the present invention according to which the second cooling is to begin only after at least a ferrite content of 70% has been reached. The reference, on the other hand, exclusively describes controlled cooling by means of several spraying headers. Clearly, the knowledge of this type of cooling as disclosed by the reference does not motivate those skilled in the art to forgo the method steps provided by the Japanese reference '650 with defined cooling parameters and to carry out the first cooling always until a degree of transformation has been reached.

In view of the foregoing, it is submitted that the claim is allowable over the references relied on by the Examiner and the Board is respectfully requested to reverse the decision of the Examiner.

A copy of the translation of Japanese reference 57-104650 requested by the Examiner is enclosed.

Respectfully submitted,

By _____

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MAILING CERTIFICATE

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By: _____ Date: June 25, 2004
Friedrich Kueffner

APPENDIX

CLAIM ON APPEAL

5. A method for producing dual-phase steels from the hot-rolled state with a two-phase microstructure of 70 to 90 % ferrite and 30 to 10 % martensite by a controlled temperature guiding and defined cooling strategy during the cooling of the steels, inter alia by means of water cooling after their finish rolling, wherein in a first cooling stage at a first cooling rate the cooling curve enters the ferrite region and in a second cooling stage at a second cooling rate faster than the first slow cooling rate further cooling is carried out to temperatures below the martensite starting temperature, the method comprising the steps of:

carrying out the first cooling stage at a cooling rate of 20-30 K/s in a cooling stretch comprised of several water cooling stages positioned successively at a spacing from one another;

allowing the cooling curve in the first cooling stage to enter the ferrite region at a temperature still so high that the ferrite formation takes place quickly; and,

before begin of the second cooling stage, which follows without intermediate air cooling and holding time directly after the first cooling stage, transforming already at least 70 % of the austenite to ferrite by continuing cooling of the first cooling stage during the transformation of the austenite into ferrite up to the desired ferrite contents of at least 70 %.